

# NASA TECH BRIEF

## Lyndon B. Johnson Space Center



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### Strain Arrestor Plate for Mounting Rigid Insulating Tiles: A Concept

#### The problem:

Metal structures used in extreme temperature environments often require an insulating tile cover for protection. One commonly used insulating tile is silica which, in comparison with metals, is impermeable to heat, has a relatively low strength, and a low coefficient of thermal expansion. The problem with using silica tiles, lies with the bonding material, particularly for low-temperature applications. Most bonding materials lose their flexibility at temperatures below the glass transition range, and begin to act as rigid connectors. Thus, stresses on the underlying metal are translated directly to the tile, which spalls and cracks.

#### The solution:

A strain arrestor plate bonded between the insulating tile and the metal, using a silicone rubber compound developed for extreme temperatures, prevents the tiles from cracking.

#### How it's done:

In the new configuration, as shown in Figure 1, a strain arrestor plate is sandwiched between a structural member and a thermal insulation tile. The plate is attached to the structural member by a layer of flexible bonding agent, and the tile, in turn, is attached to the plate by a bonding layer which may be either flexible or hard. The configuration shown in Figure 1 is

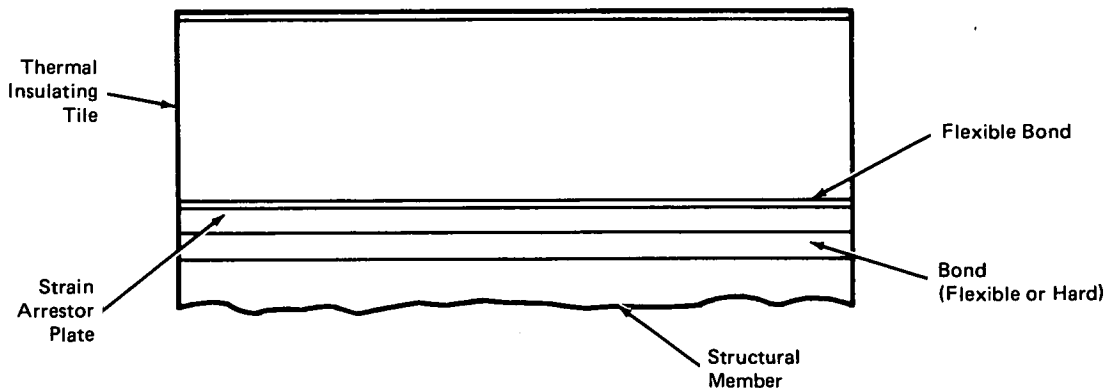


Figure 1. Thermal Insulation Protected by a Strain Arrestor Plate

(continued overleaf)

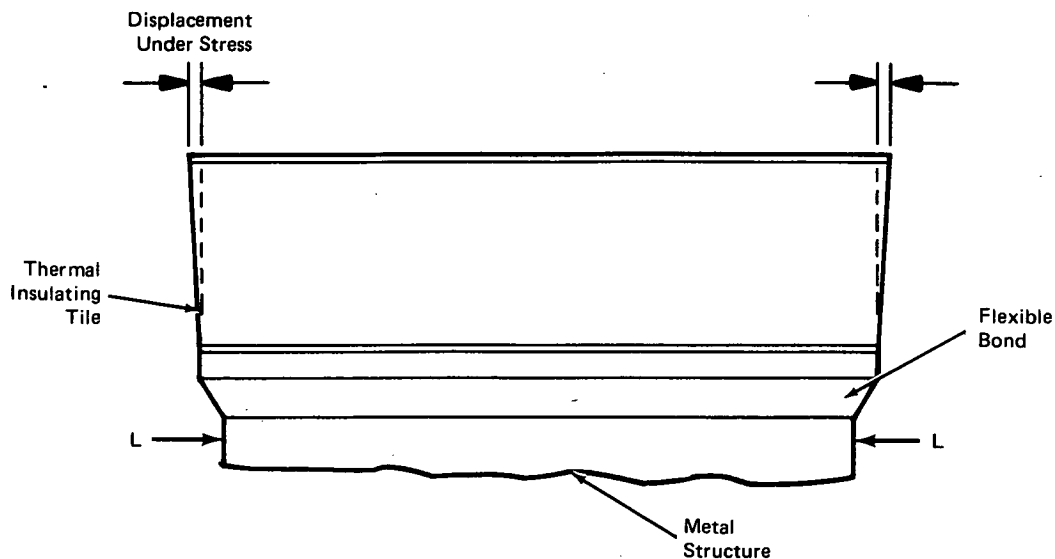


Figure 2. Thermal Insulation Under Load Stress L

in a state of zero stress, while Figure 2 shows the same configuration under the influence of a compression load L.

The strain arrestor plate is made of a material having a coefficient of thermal expansion similar to that of the insulating material. Although the plate may be formed from an appropriate alloy, it has been found that a combination of graphite fibers in an epoxy resin is satisfactory and much lighter in weight.

**Note:**

Requests for further information may be directed to:  
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 Reference: TSP73-10465

**Patent status:**

This invention is owned by NASA, and a patent application has been filed. Inquiries concerning non-exclusive or exclusive license for its commercial development should be addressed to:

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